Dietary Carcinogenesis

Potent heterocyclic amines in cooked food

LLNL's Biology and Biotechnology Program has a large multidisciplinary effort incorporating chemists, molecular biologists, physicists, environmental scientists, and genetic toxicologists to try and understand the risk to humans from eating potent mutagens/carcinogens in their diet.

APPLICATIONS

- *High part per trillion analysis of heterocyclic amines in foods*
- *Bacterial mutagenicity assessments of food*
- *In vitro and in vivo toxicology measurements of foods*
- *Risk assessments based on food consumption and rodent susceptibility to tumors*
- *Synthesis of heterocyclic amines*
- *Determination of DNA binding of carcinogens in rodents and humans*

Standard North American cooking processes such as broiling, frying, and barbecuing, heat processing, and pyrolysis of protein-rich foods induce the formation of potent mutagenic and carcinogenic heterocyclic amines. These same compounds produced tumors at multiple organ sites in both mice and rats. Most notably, colon and breast tumors were induced in rats. Nonhuman primates following feeding of one of these heterocyclic amines, IQ, have all developed (100%) hepatocarcinomas after an extremely short latency. Furthermore, epidemiology studies suggest a good correlation of meat consumption with cancer in humans. Because of these findings, it is important to determine whether these mutagens/carcinogens contribute to human cancer incidence.

Methods utilized

We have state-of-the-art mass spectrometry, NMR spectrometry, HPLC analytical capability, computer modeling of carcinogen structure, intermediates, and macromolecular interactions, genetic toxicology tests such as chromosome painting for translocations, CHO cell mutagenesis, bacterial mutagenesis, and DNA sequencing. We also use the most sensitive measure of DNA binding known, accelerator mass spectrometry, a unique resource available at LLNL.

Availability: We welcome discussions with potential partners and collaborators.

Contact

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